

# ABSTRACT OF THE DISCLOSURE

A fuel cell system calculates a water quantity  $Q_w$  produced by a fuel cell from an output current  $I$  of the fuel cell, and at the same time calculates saturated water vapor contents  $Q_{wa}$  and  $Q_{wc}$  in exhaust gases based on exhaust-gas flow rates  $Q_a$  and  $Q_c$ , exhaust-gas pressures  $P_a$  and  $P_c$ , and exhaust-gas temperatures  $T_a$  and  $T_c$  of the anode side and the cathode side, respectively. Then the system calculates a water quantity control ratio that is defined as  $t = Q_w / (Q_{wa} + Q_{wc})$  and controls operation of the fuel cell by controlling one or more of the exhaust-gas flow rates  $Q_a$  and  $Q_c$ , the exhaust-gas pressures  $P_a$  and  $P_c$ , the exhaust-gas temperatures  $T_a$  and  $T_c$ , and a current  $I$  of the anode side and the cathode side in a direction such that a deviation  $\Delta t$  between the water quantity control ratio  $t$  and a value of one is canceled out. By this control, the fuel cell can be operated with excellent performance, without humidifying gases of the anode side and the cathode side.